the one should not derive some benefit from the advances made by the other. Science, however, is the pioneer, while art successfully applies the properties and powers of matter for the accomplishment of its purposes, often placing in the hands of science the means of extending its investigations. To elucidate these statements, two or three instances may be mentioned in which the study of physics has been most advantageous to the progress of the mechanical arts.

As a maritime people, our prosperity greatly depends upon our facilities of water communication with other nations; and consequently the improvement of naval architecture is, to us, of the greatest importance. The business of a naval architect is to construct a vessel, whether for war or burden, of such a shape that it may be conducted with safety over the ocean, and at the same time offer the greatest possible convenience for cargo and men. Could we pass in review the history of this art, we should not fail to observe that it has been entirely dependant on the progress of natural philosophy. There are two questions which immediately present themselves to the mind when we consider what is required in the construction of a vessel; what constitutes the stability of floating bodies? and what is the solid of the smallest resistance? The science of hydronamics answers both these questions, and thus provides data on which calculation may in all cases be established.

The stability of a floating body depends upon the situation of the centre of gravity in relation to a point called the meta-centre; that is, the point where the axis of the centre of gravity of the body, and of the fluid which it displaces, intersect each other. When this centre of gravity of the body is below the meta-centre, it is stable, when above, unstable, that is, it will upset; and when the two points coincide it is indifferent to motion. These facts are evidently calculated to assist the naval architect at all times to provide a vessel which, with her cargo, may float with stability upon the water.

But every floating vessel would not be suited for the purposes of navigation; for although all bodies experience resistance in moving through fluids, that resistance will differ according to their shape. A line-of-battle ship would require a much greater power to move her with a given velocity broadside first, than is required to move her in the usual manner. A broad surface, then, moving in a fluid, experiences a greater